Pigment production in response to deficiency in DNA repair

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Pigment production in response to deficiency in DNA repair

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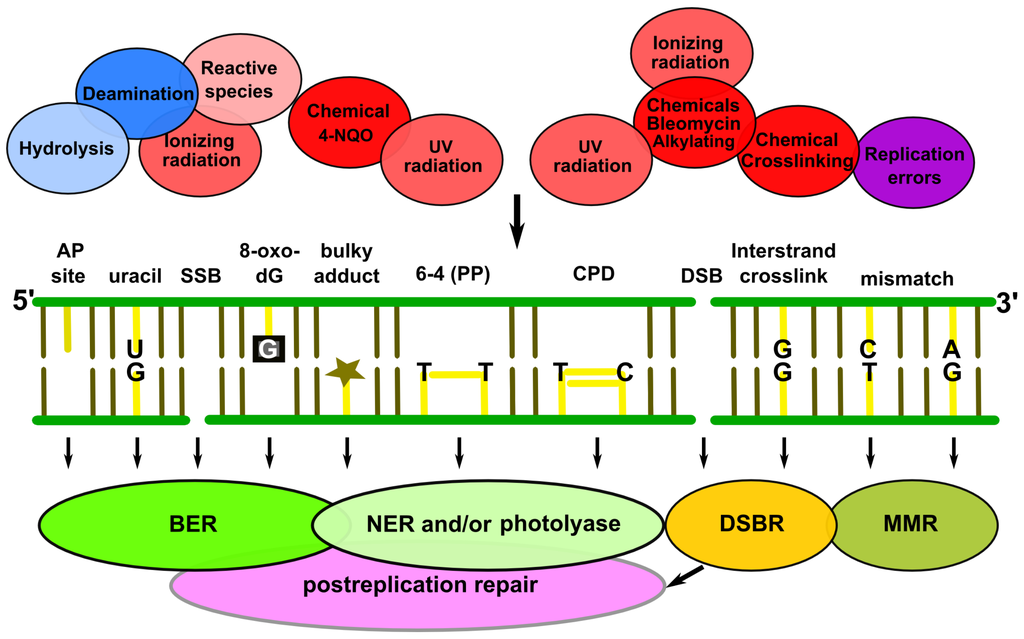
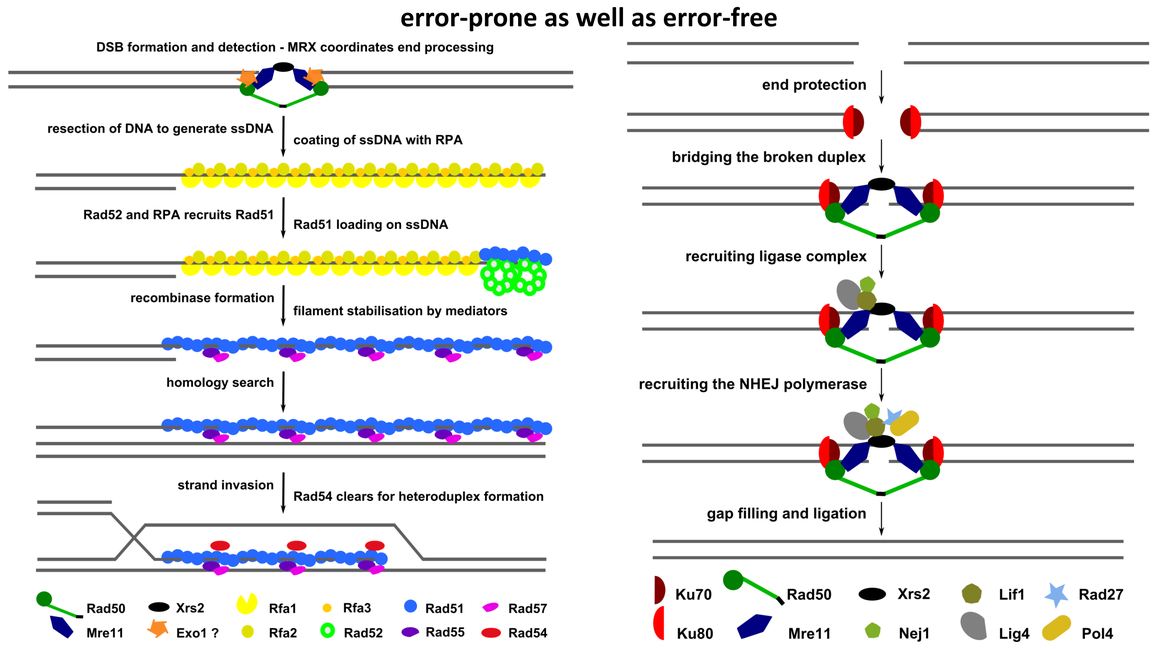
"DNA lesions cause various problems within cells, and all living organisms have repair machineries to deal with these threats. The most severe defect is a double-strand break (DSB). We are studying this implication in Aspergillus nidulans, due to fact that the choice of pathway in DSB repair is directing the outcome of gene targeting and genetic stability in industrial production strains"

DNA damaging agents, their corresponding lesions and main modes of repair

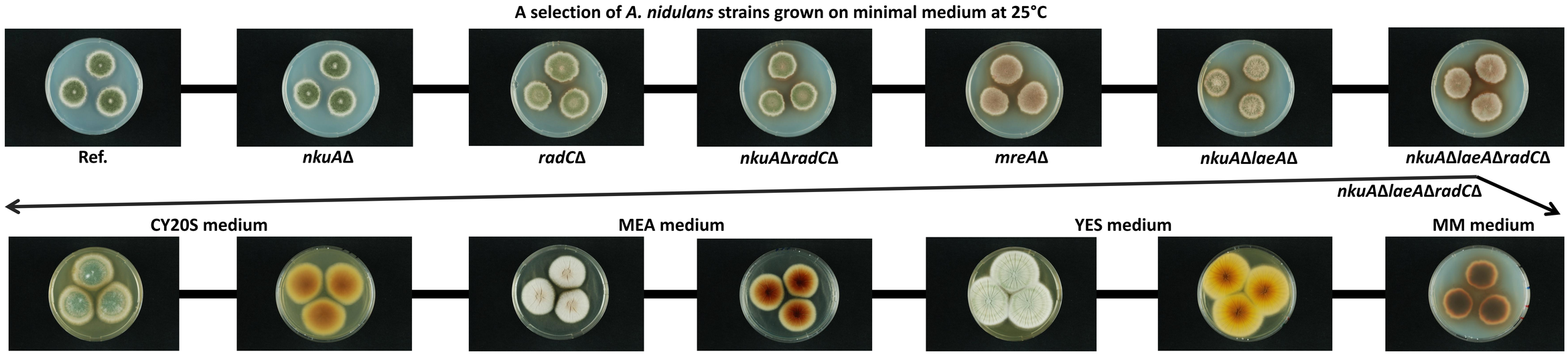


The two main activities in *S. cerevisiae* DSB repair and proposed function of main repair enzymes. Homologous recombination (HR) uses sequence homology to perform error-free repair of DSBs, whereas non-homologous end-joining (NHEJ) reassemble broken ends with or without end processing, and thus are error-prone as well as error-free

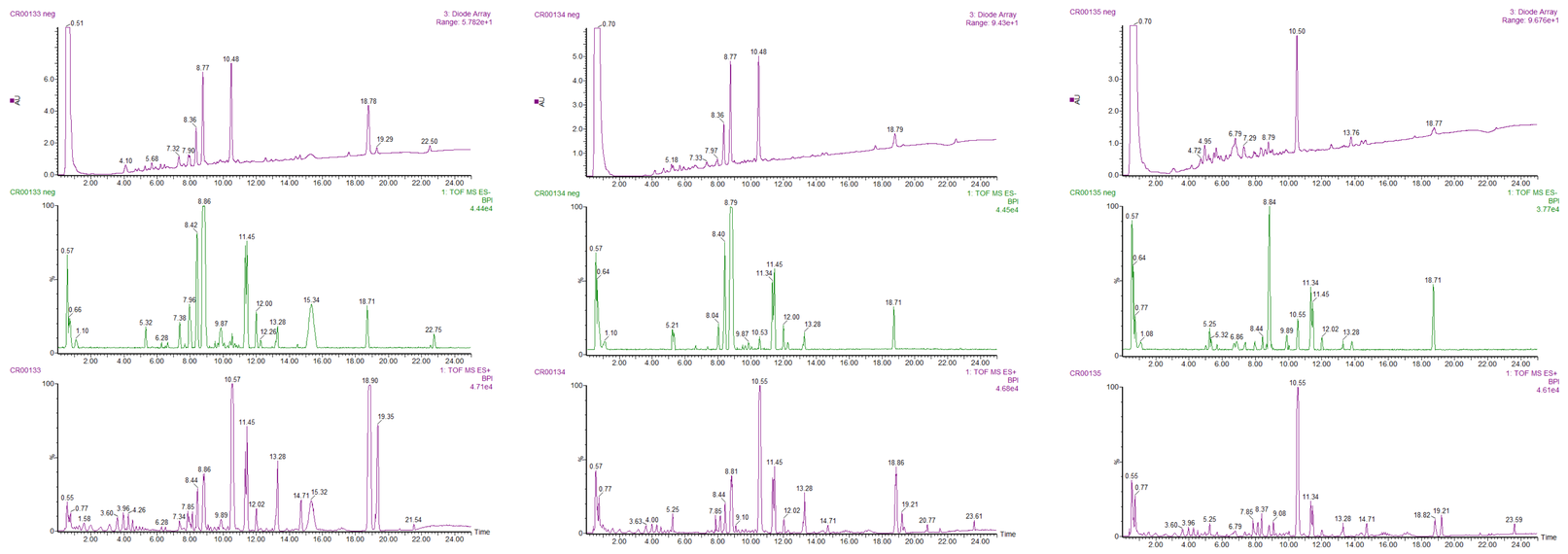


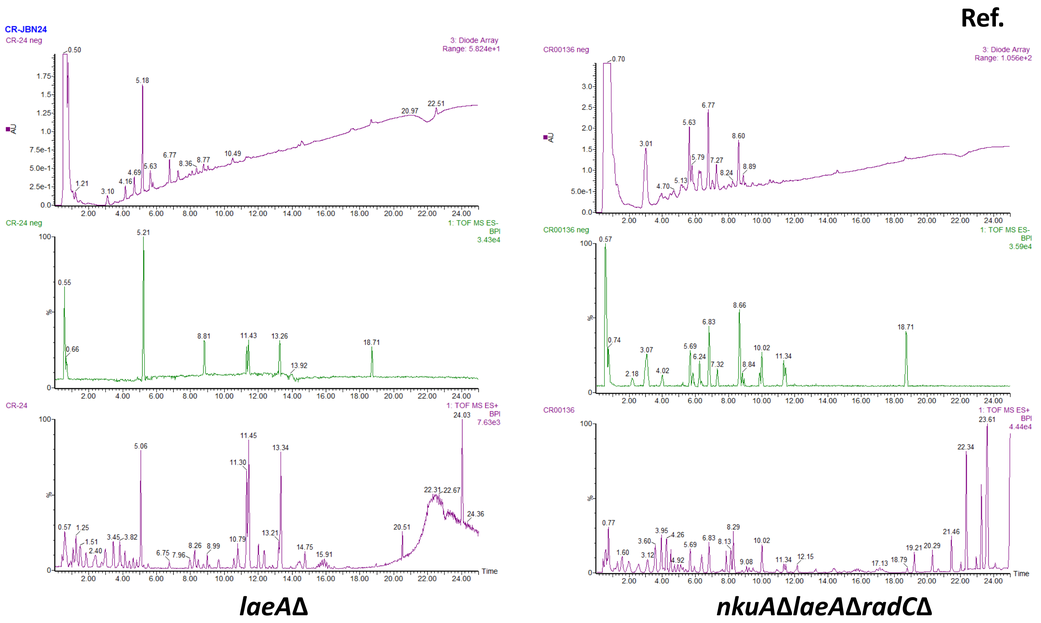
"Metabolites play an important role in many aspects of the fungal metabolism. We have observed that mutations in the HR apparatus result in the production of reddish pigment(s). The amount of pigment produced in the individual mutants of HR seems to correspond to the importance of the mutation in DNA repair. Colored fungal metabolites are often polyketides (highly bioactive and diverse compounds), which can be beneficial or detrimental to human and animal health. We have therefore launched a study of this response related to stress in repair of DNA damage and the regulation of the response"

A selection of *A. nidulans* strains grown on minimal medium at 25°C



"The strains were subjected to HPLC and MS analysis in the investigation of the pigment production in the individual mutants. This has revealed that the mutations in the HR apparatus affect the production of both known secondary metabolites and some yet unidentified colored compounds. Lack of LaeA (a common regulator of sec. metabolism) has positive and negative influences in the overall production"





"Two candidates for the reddish pigments observed (shown in the spectres) cannot be detected in the reference strain at the various conditions tested, but are produced in high amounts especially in the DSB repair impaired laeAΔ strain. The two compounds are likely based on an anthraquinone, and the NMR analysis will contribute to their elucidation. The wealth of new data from this study will hopefully give insight into a fascinating utilization of complex metabolites in connection to essential processes involving integrity of DNA"